

Conditions of Linear Relationships 2.11
p. 142-147

First Differences (Finite Differences) - when the values of the independent variable increase by 1 the differences between the set of dependent variables form a set of finite differences

This calculation is demonstrated on a Difference Table

x	y	
1	4	
2	6	
3	8	
4	10	
5	12	
6	14	

$\Delta y (y_2 - y_1)$
 $6 - 4 = 2$
 $8 - 6 = 2$
 $10 - 8 = 2$
 $12 - 10 = 2$
 $14 - 12 = 2$
Linear

When the first differences are all the same the relationship is said to be linear
When the first differences are different the relationship is said to be non-linear

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Demo 1 a) 2 and 3 on p.145

x	y	Δy
1	3	
2	6	$6 - 3 = 3$
3	9	$9 - 6 = 3$
4	12	$12 - 9 = 3$
5	15	$15 - 12 = 3$

Linear

3) $y = mx + b$
 $(1, 3)$ $(2, 6)$
 x_1, y_1 x_2, y_2
 $m = \frac{y_2 - y_1}{x_2 - x_1}$
 $m = \frac{6 - 3}{2 - 1}$
 $= \frac{3}{1}$
 $y = 3x + b$
 $(1, 3)$
 $3 = 3(1) + b$
 $3 - 3 = b$
 $0 = b$
 $y = 3x$

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p 145 - 147

2 1 b) c) f) g)

2, 3, 5, 7, 12

Mar 19-1:35 PM

Apr 13-1:02 PM